

**That Which is Claimed is:**

1. A pultrusion apparatus for manufacturing a fiber-reinforced plastic article, the pultrusion apparatus comprising:
  - a die having a first die portion and a second die portion; and
  - an energy source coupled to said die;wherein at least said second die portion is substantially transparent to energy provided by said energy source so that the fiber-reinforced plastic article is cured by energy passing through the die.
2. The apparatus according to Claim 1, wherein said energy source is an electromagnetic radiation source, and wherein said second die portion comprises a material that is substantially transparent to electromagnetic radiation emitted by said electromagnetic radiation source.
3. The apparatus according to Claim 2, wherein said electromagnetic radiation source emits electromagnetic radiation in the ultraviolet spectrum.
4. The apparatus according to Claim 2, wherein said electromagnetic radiation source emits electromagnetic radiation in the visible spectrum.
5. The apparatus according to Claim 3, wherein said second die portion comprises a quartz material.
6. The apparatus according to Claim 1, wherein said first die portion is substantially opaque to energy provided by said energy source.
7. The apparatus according to Claim 1, wherein said first die portion is substantially transparent to energy provided by said energy source.
8. A method of forming a fiber-reinforced plastic article, said method comprising the steps of:
  - continuously pultruding a fiber-reinforced plastic article to form a fiber-reinforced

plastic article having a first partially cured state;

continuously shaping the first fiber-reinforced plastic article having the first partially cured state into a spirally wound shape; and

curing the fiber-reinforced plastic article having the first partially cured state to form a spirally wound fiber-reinforced plastic article having a second cured state that is more rigid than the fiber-reinforced plastic article having the first partially cured state.

9. The method according to Claim 8, wherein the shaping step comprises the step of molding the fiber-reinforced plastic article on a rotatable mold.

10. The method according to Claim 9, wherein the shaping step further comprises the step of drawing the fiber-reinforced plastic article having the first partially cured state through a die having a cross-section to form a fiber-reinforced plastic article having the first partially cured state and having substantially said cross-section.

11. The method according to Claim 10, wherein a portion of said rotatable mold defines a portion of said die, and wherein the drawing step and the molding step occur contemporaneously.

12. The method according to Claim 8, wherein the shaping step comprises the step of drawing the fiber-reinforced plastic article having the first cured state through a die having a cross-section to form a fiber-reinforced plastic article having the first partially cured state and having substantially said cross-section.

13. The method according to Claim 12, wherein the curing step and the drawing step occur contemporaneously.

14. The method according to Claim 8, wherein the curing step comprises inputting energy into the fiber-reinforced plastic article, and wherein a ratio of the energy input per unit length of the fiber-reinforced plastic article is substantially constant.

15. The method according to Claim 14, wherein the energy is electromagnetic radiation.

16. The method according to Claim 14, wherein the energy is thermal energy.
17. The method according to Claim 8, wherein the pultruding step comprises the steps of:
- shaping an uncured fiber-reinforced plastic article; and
  - curing the uncured fiber-reinforced plastic article to form the fiber-reinforced plastic article having a first partially cured state.
18. The method according to Claim 17, wherein the step of curing the uncured fiber-reinforced plastic article comprises inputting a first type of energy into the uncured fiber-reinforced plastic article, and wherein the step of curing the fiber-reinforced plastic article having the first partially cured state comprises inputting a second type of energy into the fiber-reinforced plastic article having the first partially cured state.
19. The method according to Claim 18, wherein the first type of energy and the second type of energy are different.
20. The method according to Claim 18, wherein the first type of energy is electromagnetic radiation in the ultraviolet spectrum, and wherein the second type of energy is electromagnetic radiation in the visible spectrum.
21. A composition of matter comprising:
- from about 55 to about 85 percent by weight of a binder monomer;
  - from about 15 to about 45 percent by weight of a diluent monomer;
  - from about 0.05 to about 1 percent by weight of an ultraviolet photoinitiator;
  - from about 0.05 to about 0.5 percent by weight of a visible photoinitiator; and
  - from about 0.05 to about 0.5 percent by weight of an accelerator.
22. The composition according to Claim 21, wherein the binder monomer is selected from the group consisting of 2,2-bis[4-(2-hydroxy-3-methacryloxypropoxy)phenyl]propane, 2,2-bis-[4-(2-hydroxyethoxy)phenyl]propane dimethacrylate, 2,2-bis-(4-hydroxyphenyl)propane dimethacrylate, 2,2-bis-[4-(2-hydroxypropoxy)phenyl]propane

dimethacrylate, and mixtures thereof.

23. The composition according to Claim 21, wherein the binder monomer is 2,2-bis[4-(2-hydroxy-3-methacryloxypropoxy)phenyl]propane.

24. The composition according to Claim 21, wherein the diluent monomer is an acrylic monomer selected from the group consisting of methyl methacrylate, isobutyl methacrylate, cyclohexyl methacrylate, triethylene glycol methacrylate, ethylene glycol dimethacrylate, diethylene glycol dimethacrylate, triethylene glycol dimethacrylate, tetraethylene glycol dimethacrylate, trimethylolpropane trimethacrylate, 1,6 hexanediol dimethacrylate, 1,4-butanediol dimethacrylate, and mixtures thereof.

25. The composition according to Claim 21, wherein the diluent monomer is methyl methacrylate or triethylene glycol dimethacrylate.

26. The composition according to Claim 21, wherein the ultraviolet photoinitiator is an ether.

27. The composition according to Claim 21, wherein the ultraviolet photoinitiator is a benzoin alkyl ether.

28. The composition according to Claim 21, wherein the ultraviolet photoinitiator is selected from the group consisting of benzoin methyl ether, benzoin ethyl ether, benzoin butyl ether, benzoin isobutyl ether, benzoin phenyl ether, and mixtures thereof.

29. The composition according to Claim 21, wherein the ultraviolet photoinitiator is benzoin ethyl ether.

30. The composition according to Claim 21, wherein the visible photoinitiator is a quinone selected from the group consisting of camphorquinone, 9,10-phenanthraquinone, 9,10-anthraquinone, acenaphtheneinone,  $\alpha$ -naphthoquinone,  $\beta$ -naphthoquinone, 2-methyl-1,4-naphthoquinone, 2-t-butyl-9,10-anthraquinone, 2-ethylanthraquinone, 1-chloroanthraquinone, 1,2-benzanthraquinone, 2-methylanthraquinone, 2-methyl-3-phytyl-1,4-naphthoquinone, 2-

methyl-3-geranylgeranyl-1,4-naphthoquinone, 2,3-dimethoxy-5-methyl-1,4-benzoquinone, and mixtures thereof.

31. The composition according to Claim 21, wherein the visible photoinitiator is camphorquinone.

32. The composition according to Claim 21, wherein the accelerator is selected from the group consisting of dimethyl aminoethyl methacrylate, N,N-dimethyl-*p*-toluidine, N,N-dihydroxyethyl-*p*-toluidine, N-(2-cyanoethyl)-N-methylaniline, and mixtures thereof.

33. The composition according to Claim 21, further comprising a fiber.

34. A shaped, non-linear article formed from a composition of Claim 21.

35. The article according to Claim 34, wherein said article is an orthodontic appliance.

36. The article according to Claim 34, wherein said article is an orthodontic archwire.

37. The article according to Claim 34, wherein said article is a passive orthodontic appliance.

38. The article according to Claim 34, wherein said article is an active and/or functional appliance.

39. The article according to Claim 34, wherein said article is a general dentistry appliance.

40. The article according to Claim 39, wherein said general dentistry appliance is selected from the group consisting of alveolar ridge augmentation appliances, bone scaffolding, bridge abutments, facial reconstruction appliances, and splints.

41. The article according to Claim 34, wherein said article is selected from the group consisting of struts, curved beams, springs, and cables.